

Survey Research Hongkong Limited

Novell NetWare

**Network Management Guide**

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## PREFACE

This document contains information about the way I have set up the network here. It is intended for Network Supervisors with working knowledge of Novell Netware 386 ver 3.1, and thorough knowledge of DOS and other application software. I have tried to avoid errors in this document. If you ever come across them, please let me know to correct it.

And that technology changes on a dialy basis, if you ever came across sections that contain out-dated materials, do not be suprised.

*Chang Man Wai  
November, 1991*

## BIBLIOGRAPHY

This manual assumes the reader has read through serveral reference on Novell Netware. Some good references are listed below:

1. Lawrence, Bill, Using Novell Netware, QUE: USA, 1990.  
Concise and clear coverage on all aspects of Novell Netware. But this book does not provide much information about maintenance of a Novell Netware.
2. Sheldon, Tom, Novell NetWare 386: The Complete Reference, McGraw-Hill: USA, 1991.  
Good coverage LAN and networking basics.
3. Novell Inc., various manuals that are bundled with Novell NetWare.

This document is prepared using Wordperfect 5.1.

# Calendar

## 1991

- Mar 12 NetWare 386 v3.1A arrived.
- Mar 22 AST Premium Bravo 486/25 arrived, to used as file server.
- Apr 12 Acer server replaced by AST server.
- Jun ATC expanded the coaxial network.

## 1992

- Jan 9 System Team meeting on network layout after office renovation with Peter Ng. Decided to use mixed topology of UTP and coaxial network. The Prime network would be maintained. Setup committee set up.
- Jan 13 Meeting with Expert System. Suggested UTP network based on NetWorth. Four brand new software-configuration NS EtherNODE-16AT were received.  
Meeting with Aba. Suggested UTP network based on ISOLAN.
- Jan 14 Meeting with Asian Electronics. Suggested UTP network based on CNET and Krone products.  
Meeting with CSL. Suggested UTP network based on AT&T Plenum cabling system and SynOptics.
- Jan 16 CSL presented her proposal. Quotation received.  
Expert presented her solutions. Quotation received.
- Jan 20 AE presented her solutions. Quotation received.  
Aba presented her solutions. Quotation received.  
Swire Engineering, the one responsible for the telephone system of the new office, wanted to lay our UTP network as well. Meeting with them in 6/F Warwick House.
- Jan 21 Received Swire's quotations. Suggested UTP network based on Krone cabling accessories and 3Com/HP hubs.
- Jan 27 Shortlist Swire and Expert as potential vendors of the new network. System Team re-emphasized the quality of the AT&T Plenum system and NetWorth products.
- Jan 29 Second presentation by Expert.  
First presentation by Swire.
- Jan 30 CSL come to SRH themselves. Price cut, comparable to Swire. Revised quotation submitted.
- Jan 31 Final attempt by CSL to win the contract again.  
That afternoon, the Committee decided on Swire as the cabling vendor.
- Feb 3 Meeting with Swire. Prices on hardware and cabling system finalized. 3Com Multi-Connects employed, an aged product line from 3Com.
- Feb 11 Peter Ng, Robert Li and Wendy Leung was appointed to pinpoint which work stations were going to have network outlets in East and West Wing.  
West Wing network diagrams drafted by Chang Man Wai and submitted to Swire.
- Feb 12 Meeting with the network sub-contractors of Swire. BNC network diagram drafted and submitted by Chang Man Wai. 3Com MultiConnect hubs ordered. Swire formally appointed by Peter Ng as the new network contractor.
- Feb 13 Error in Swire's network contract found. She was notified.
- Feb 14 Peter Ng added six more nodes in the East Wing.
- Feb 17 Corrected contract received from Swire.
- Feb 21 A 3D diagrams of the future computer room was drawn by Chang Man Wai.

Feb 25            Networking material delivered to SRH.

Feb 25            Prime network was being laid.

Feb 28            AST Premium 486 33/TE EISA server arrived together with NetWare 386 v3.11, with two Mylex adaptor. System already configured by Expert System. This system will serve the Data Processing Department.

Mar 3             3Com MultiConnects and their line cards arrived.

Mar 5             Coaxial network in Finance and DP ready.

Mar 9             DP moved into West Wing.

Mar 10            BNC line cards for MultiConnect received.

Mar 11            NS EhterNODE UTP card received from Expert.

Mar 16            Testing all MultiConnects.

Mar 20            10 UTP cards received from Expert. 600M SCIS disk received for upgrading the Preimum Bravo 486/25 server. First attempt to upgrade the NetWare 3.1a to 3.11.

Mar 8             Swire informed of 5 temp UTP lines in the old office area.

Mar 27            Bravo 486/25 upgraded from 300M to 600M.

Mar 30            Temp UTP lines installed. Coax network for CATI was being laid.

Apr 3             Cabling Rack arrived.

Apr 10            Second phrase of office renovation. 30 UTP nodes completed. Old Coax network partially destroyed.

Apr 15            Order 10 3C503 UTP adaptor from Swire.

Apr 16            Third phrase of network renovation. Coax network in East Wing completed removed.

Apr 25            Another 25 3C503 adaptors ordered.

Apr 28            5 line cards order for use with MultiConnect.

May 5             Six users suddently moved into the new office in East Wing. Line cards for MultiConnect arrived. 10 EtherNODE received.

May 15            End of Office Renovation. All UTP network completed. 3 nodes found damaged. And 3 more nodes were demanded.

June 2            4 nodes confirmed. Swire contacted to add them.

June 8            4 nodes added by Pioneer System Co.

June 11           Invoice received from network contractor for the 4 new nodes.

July              Nearly 40 AST Bravo 386SX/25 were purchased. Each come with AST-DOS 5, Windows 3.1, and Microsoft Mouse.

Jul 17            New AST Premium 486 Premium SE 4/33 server from Expert System arrived, with 1 GigaBytes of SCSI-2 fixed disk, 2 Mylex EISA adaptor and a new model of APC UPS. NetWare Premium 386 V3.11 arrived as well. Machine configured and NetWare installed. The new server aims to off-load SRH486DP from PCRAS processing.

Jul 18            Arrival of NetWare Preimum 3.11 serial number 06487521

Jul 20            NetWare and system were configured by system team. The server is added with a NS EtherExpress ISA 16-bit adaptor dedicated for the CATI coaxial network, given the low reliability of the CATI network.

- Jul 21           New server moved to computer room, named RA. The network outlet from the PCRAS operators of RA Dept were grouped together as well into one MultiConnect as well, to remove their traffic from the DP network. Outlet numbers are 69,70,71,74,75.
- Aug 4           One Printronix P300 is connected to SRH486DP. It is monitored by PSERVER using polling with XON/XOFF flow control, running at 9600 bps. This is to cater for the heavy printing load of Data Processing. A special null-modem cable is wired to connect it to the COM1: of SRH486DP.
- Aug 7           Four 10base-T UTP modules for MultConnect arrived. That will add 12 unused ports to existing network in the East Wing.
- Sept            CATI network is completely installed with 10 AST Bravo 386SX-16 and 80286 AT with 1 MB memory. More NE2000 adaptors are added to the file servers to have one NE2000 dedicated to handle CATI network so as to separate failures in CATI network from the rest of the network.

## **1993**

- Jan 27           Contact Pioneer System again. This time all seats in East Wing and some seats in West Wing will be given new UTP outlets. The total number of new outlets is about 38. Cost of the project was about 32000. And rumours said that the China division SRH's Research Department (totally about 30 people) would be moved to a new building.
- Feb 1            Ordered five TP modules for the 3Com Multi-Connect Hubs from Swire Systems.
- Early Feb       The two Printronix P300 printers were broken. Their print heads were severely damaged after years of non-stopped services.
- Feb 9            Meet with Expert Systems: Edward Chung. We talked about a possibly remote bridge/routers for linking with the new China office. The possibilities of using an EISA server to replace SRH486A and the introduction of hi-speed routers for connecting local servers were being discussed. We also talked about whether Expert could run training sessions for SRH.
- Feb 11           Pioneer System completed adding 38 nodes to the West and East Wings after 4 days of work. She also removed the serial cables that connected the PCs in Data Processing Department to the Prime 4050. The serial cables were expected to be sold since contemporary UNIX boxes used TCP/IP ethernet not serial lines.  
  
The total number of UTP outlets in SRH totalled to 162. A new schematic was drawn and posted on my workstation. Though the UTP hubs don't have SNMP facilities, they have been very stable for the past year.

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## Chapter 0 Directories Description

All SRHLAN file serves has the following general directory setup:

SYS:MAIL	Electronic mail boxes for individual users. The mail box id is a function of the user's name. 1 is the mail box for supervisor. This place is where Peegasus Mail stores the mail messages of individual user.
SYS:LIB	All application and system software are stored in separate sub-directories of SYS:LIB. These include:  Wordperfect 5.1 (August release) Harvard Graphics v2.3 Harvard Graphics v3.0 Lotus 1-2-3 v2.2 (mainly for Chinese system users) Lotus 1-2-3 v2.3 XTree Pro 1.0 PC Tools Deluxe v6.0 dBase III+ 1.0 Norton Utilities v6.01 Norton PC/Anywhere 4.5 FoxpPro/LAN 2.0 ETen 2.2 Eten 3.1 Chung Hon 2.55 CWI Chinese Word Processor v2.55 Peegasus Mail 2.3 Release 4
SYS:LIB\BATCH	This directory contains all batch files for invoking third-party application software and SRH information systems. Some the batch files contains tricks to make a single-user commercial software to behaves as a mulit-user program. Some are specially designed for fulfilling users' daily networking needs, like SELEQ for network printer selection.
SYS:USER	Individual user's data repository. Each user has a sub-directory which has the name of his/her login name. As a result, each user's login name could not be longer than eight characters.
SYS:DOS	Various version of MS- and PC-DOS, for example, SYS:DOS/V5.00 for MS-DOS 5.0 and SYS:DOS/V3.30 for PC-DOS 3.30. Note that OEM DOS like AST-DOS 5.0 is not included.
SYS:PUBLIC	General Novell utilities like SYSCON.EXE, PCONSOLE.EXE and many others. The network menu SRH486A.MNU is stored here as well.
SYS:SYSTEM	Novell system files. Contain the remote boot file generation programs. You will find AUTOEXEC.NCF here.
SYS:FONTS	HP LaserJet IID softfonts.
SYS:DP	Development tools for System Team.



SYS:SRHIS                   SRH Information Systems. Each component of SRHIS has its own directory:

PAYROLL	Full-time staff Payroll system
MAILLIST	Mailing List System
JOBSHEET	Ad Hoc Job Control Sheet System
TIMECOST	Time Sheet System
DBA	Database Administrator
PUBLIC	Shared DB of SRHIS

SYS:AUTOUSER           Users's default AUTOUSER.BAT and memos and news.

SYS:AUTOUSER\IPX      All IPX drivers for different LAN adaptors

SYS:AUTOUSER\NETX    NETX NetWare DOS emulation shell.

SYS:LIB\SYSLIB        Assorted DOS goodies and in-house developed utilities, for example, SWEEP.EXE, HOME.EXE, GETGRAPH.EXE, LISTQ.EXE, SHOWP.EXE, DIRE.EXE, GETQ.EXE, QMON.EXE and DIRX.EXE.

# Chapter 1

## User Information

### User Naming

NetWare supports login names of length 42 characters. But in SRH's network, all network login names should contain at most eight characters. This limit is set deliberately so that the name of a user's home directory in the file server matches with the login name. DOS file names contains a eight-character file name and a three-character extension.

It is also recommended that the network user names should contain no numeric digits. The scheme of creating a login name are briefed below:

```
Function get_login_name(user first name, user last name, user christian name)
If length(user first name) > 8
    login name = user first name[1..8]
else
    login name = user first name
    if user has christian name
        login name = login_name + first_character(user christian name)
    else
        login name = login_name + first_character(first_word(user last name)) +
            first_character(second_word(user last name))
```

All network login name should be unique across the whole SRH network. The term SRH network covers all the file servers and mini-computers within the company premise. Examples:

Chang Man Wai, Johnny	CHANGJ
Chang Man Wai	CHANGMW
Douglas, Micheal	DOUGLASM

### Special Users

There are some special users in the Network:

<b>SUPERVISOR</b>	Novell NetWare supervisor
BACKUP	Used for backup
PRINTER	Used to manage the print servers by secretaries
GUEST	For guests of SRH

## Chapter 2 Group Information

### Grouping Criteria

Groups are created to simplify the management of users and their resources easily. There are four ways to form groups:

- a. Location of the user's desk, which determines the position of his/her nearest printer
- b. In-house applications will a user be allowed to use
- c. Department/team in which he/she works in.
- d. His positions within the department, which determines what directories are available to him/her
- e. The hierarchy chart of the company
- f. Special networking/company functions that he/she will perform

### Basic Groups

The groups are:

EVERYONE	All users
DP_SYSTEM	DP System Team
SECRETARIAT	All secretaries
P_SEC	Personal Secretaries
A_SEC	Assistant Secretaries
P_SEC_SUPER	Super-ordinates of Personal Secretaries
A_SEC_SUPER	Super-ordinates of Assitant Secretaries, including P_SEC
RETAIL_AUDIT	All staff of Retail Audit Team
SRHIS_JB_USERS	SRHIS Job Sheet system users
QUEUE_OPERATOR	Those who are allowed to manage print servers and queues
AREA_DP	Users who are in the area of Data Processing

## Chapter 3 System Security

Netware's security access control is quite simple. It is detailed in the book "Using Novell Netware" by Bill Lawrence from QUE. Some important points are:

1. Once you grant a person access to a particular directory say SYS:\A, the user will be able to access all the subdirectories of SYS:\A.
2. As a result of point 1, **NEVER** grant any user access to SYS:\. He will then be able to see ALL data in the network drive. BACKUP is a special user that is given the right to SYS:\.

### Group Level

Users in group EVERYONE have access to all application software in SYS:LIB. The set of software forms the minimum amount of services a network user can enjoy. The directories that they can access are: All these application programs, unless stated otherwise, are **SINGLE-USER** version only.

Users in groups other than EVERYONE will have access to special directories in the network. They will be entitled to services available specially to individual group. For example, users in Finance Department share a directory named SYS:USER\FINANCE.

### User

Normal user should NOT be allowed to add files to SYS:LIB and other NetWare directories like SYS:LOGIN, SYS:SYSTEM and SYS:PUBLIC. This will lead to uncontrollable expansion of used space. Users tend to leave unused programs in the network hard disk. Users can expose or hide his/her directory to/from others using the NetWare command GRANT and REVOKE.

### Files

Files security is enforced by setting individual file's attributes flag and setting the trustee for individual directory. Each user will have full access to his own data directory and the mail directory. He will benefit from being a member of the group EVERYONE. He can be a member of other groups, giving him additional access rights to other directories.

### Password

All user accounts must have UNIQUE passwords. This is enforced by Novell's password selection feature. In addition, user should be encouraged to change his/her password regularly. Novell will remind user when his/her password expires. Novell will allow the user to login with the old password for a fixed number of times (GRACE LOGIN). But after that, the user must change his/her password.

Length of password is important. A password length of eight characters is common in most mainframe and mini computer systems.

There is a single account in the network that can be accessed without password: GUEST. This is to simplify the login procedure for visitors.

## Chapter 4 NetWare Setup

### MAP

The number of search drive should be kept to a minimum number, otherwise, if a user entered a wrong commands, the network shell will search a long path, generating unnecessary network traffic and increasing the response time. Assign a search drive to directory that contains regularly used application software, like WordPerfect, FoxPro/LAN, utilities, batch files, NetWare's SYS:PUBLIC. SYS:LOGIN is not necessary after login in.

Drive F: always maps to the root directory a user's home file server, for example, SRH486A/SYS:.

These mapping should NEVER be changed. Users should be informed not to re-map these drives. They will help system maintenance work as well as software installation.

### COMSPEC

If the user has a local hard disk, there is no need to reset the COMSPEC. If the users are using remote boot, COMSPEC should set to network's copy of DOS COMMAND.COM of the appropriate version. Note that there must be spaces before and after the equal sign (some form of bug in LOGIN.EXE).

### PATH

The PATH parameter is changeable by the user. It is recommended that the MAP command instead of DOS command SET should be used to set the paths. The reason being that PATH will always overwrite the whole old setting, but MAP does not. You modify part of the PATH without affecting others. Besides, the length of PATH will be smaller if it is set up using MAP, saving lots of environment spaces. Moreover, when you logged out, mapped devices will be removed from the path automatically.

### System Login Script - SYS:PUBLIC/NET\$LOG.DAT

The initial SLS is as below:

```
* disable error messages and echoes
map display off
map errors off

* read memo
if "%1" <> "PRINTER" and "%1" <> "BACKUP" then # sys:lib\syslib\read
sys:autouser\memo.012
write

* set default login directory
map f: = sys:user\%LOGIN_NAME

* special users
if "%1" = "Alex" then begin
  include f:\USER\Alex\Alex.inc
  Exit "Auto.bat"
end

if "%1"="KAU" then begin
  dos set wks=P_STATION
  exit "F:AUTOUSER.BAT"
end

* set programs search pathes
* minimum path
map ins s1:=sys:public
map ins s2:=sys:lib\syslib
map ins s3:=sys:lib\batch
map ins s4:=sys:lib\norton
map ins s5:=sys:dos\%OS_VERSION
map ins s6:=sys:lib\wp51
map ins s7:=sys:lib\pctools
map ins s8:=sys:lib\foxpro2
map ins s9:=sys:lib\dr11

if "%1" = "SUPERVISOR" then begin
  dos set homedir = "\\USER\SYSTEM"
  dos set userid = "%LOGIN_NAME"
  dos set mailid = "%USER_ID"
  dos set norton = "\\USER\SYSTEM"
```

```

dos set wp      = "/d-f:\user\system/nt-1/ps-f:\user\system"
dos set dr      = "/d-f:\user\system/nt-1/ps-f:\user\system"

map ins s5:=sys:system
map ins s7:=sys:ccadmin
map f:=SYS:USER\SYSTEM
map p:=SYS:\DP
map l:=SYS:\LIB
map o:=SYS:\AUTOUSER

drive f:
exit "autouser.bat"
endif

* define environment variables, some are used in FoxPro applications
dos set userid = "%LOGIN_NAME"
dos set mailid = "%USER_ID"
dos set nc     = "\\USER\\%LOGIN_NAME"
dos set norton = "\\USER\\%LOGIN_NAME"
dos set homedir = "\\USER\\%LOGIN_NAME"
dos set prompt = "<%LOGIN_NAME> [ $p ] "
dos set wp     = "/d-f:\user\%LOGIN_NAME/nt-1/ps-f:\user\%LOGIN_NAME"
dos set dr     = "/d-f:\user\%LOGIN_NAME/nt-1/ps-f:\user\%LOGIN_NAME"
dos set netmenu = "SRH486A"

if MEMBER OF "DP_SYSTEM" then begin
drive f:
exit "autouser.bat"
end

* default network printer selection based on a user's geographical location

If "%1"<>"BACKUP" and "%1"<>"PRINTER" THEN BEGIN
  If MEMBER OF "EVERYONE" THEN #NCopy SYS:Public\Other.bat
F:\User\%LOGIN_NAME\autouser.bat
  IF MEMBER OF "AREA_RA" THEN #NCopy SYS:AUTOUSER\A_RA.BAT
F:\User\%LOGIN_NAME\autouser.bat
  IF MEMBER OF "AREA_RD" THEN #NCopy SYS:AUTOUSER\A_RD.BAT
F:\User\%LOGIN_NAME\autouser.bat
  IF MEMBER OF "AREA_SEC" THEN #NCopy SYS:AUTOUSER\A_SEC.BAT
F:\User\%LOGIN_NAME\autouser.bat
  IF MEMBER OF "AREA_QT34&QRU" THEN #NCopy SYS:AUTOUSER\A_Q34QRU.BAT
F:\User\%LOGIN_NAME\autouser.bat
  IF MEMBER OF "AREA_CWI" THEN #NCopy SYS:AUTOUSER\A_CWI.BAT
F:\User\%LOGIN_NAME\autouser.bat
END

* festival greeting
if "%DAY" < "26" and "%MONTH" = "12" and "%DAY" > "20" then write "Merry
Christmas! yah..."
if "%MONTH" = "1" and "%DAY" < "7" then write "Happy New Year!"
if "%MONTH" = "12" and "%DAY" = "31" then write "Farewell to %YEAR!"
if "%MONTH" = "1" and "%DAY" = "2" then write "Ladies and gentlemen! Today
is the second day of ... %YEAR!"
if "%MONTH" = "2" and "%DAY" < "31" and "%DAY" > "21" then write "Kung Hei
Fat Choi!"

* drop to user's AUTOUSER.BAT which sets up printer capture
drive f:
exit "autouser.bat"

```

**Additional information that you may like to include in the system login script includes:**

```

* user status report
write
write ";Greeting_time;", %FULL_NAME."
write ";Login_name;" on file server ";File_server;", "
write ";MACHINE running %OS ver %OS_VERSION."
write
write "%MONTH_NAME %DAY, %YEAR (%DAY_OF_WEEK)"
write "%HOUR:%MINUTE:%SECOND %AM_PM."
write
write "%STATION"
write "%NETWORK_ADDRESS"
write "%P_STATION"
write
write "F:\MAIL\%USER_ID"
write "F:;<homedir>"

```

This login script maps drive F: to the user's own data directory. It then set up the search drives. Two environment variables COMPSEC and HOME will be set up. The first variable states the location of COMMAND.COM. The second one will indicate the default data directory of the user for use by the program HOMEPATH.EXE in SYS:LOGIN. HOMEPATH.EXE will return a user to his/her data directory, as recorded in the DOS environment variable HOME.

README.COM will be executed which itself is a file browser for the user to browse through the file ANNOUCE.ASC. ANNOUCE.ASC contains hints and tips for using the network and more important the recent annouements aboou the network.

## User Login Script - SYS:MAIL/????????/LOGIN

Not used currently. Its function is replcaed by AUTOUSER.BAT.

## AUTOEXEC.NCF

To better understand this script, please read Chapter 9 first on the hardware configuration of the File Server. This file holds a sequence of console commands that will be executed automatically whenever the file server volumn is mounted. These commands will be executed ONLY in the server. The current content of AUTOEXEC.NCF (stored in SYS:SYSTEM) is:

```
file server name SRH486A
ipx internal net 48625
; network adaptor driver
load NE2000 port=340 int=5 frame=ETHERNET_802.3 name=national_2
load NE2000 port=320 int=2 frame=ETHERNET_802.3 name=novell_1
load NE2000 port=300 int=3 frame=ETHERNET_802.3 name=national_1
bind IPX to novell_1 net=1
bind IPX to national_1 net=2
bind IPX to national_2 net=4
; for RCONSOLE
load remote srhdp
load rspx
;
; settings made by observation, to tune file server performance
;
set maximum service processes=10
set maximum packet receive buffers = 50
set maximum directory cache buffers = 200
set directory cache allocation wait time = 1.0
;
; I made this setting because most work in SRH are word
; processing. The directories are not changed frequently
; as in database applications
;
set directory cache buffer nonreferenced delay = 1
;
; if the server has UPS, the following settings are safe
; and can improve network performance.
;
set dirty disk cache delay time = 10
set dirty directory cache delay time = 10
;
; settings made by observation
;
set new service process wait time = 1
set maximum concurrent disk cache writes = 25
;
; The following change (to disable secure console)
; is made by Yung, 22 Aug 91.
; Yung enable the command : secure console (23 Aug 91).
secure console
```

## **STARTUP.NCF**

This is the config file required by NetWare 386 to access the disk hardware of the file server volumes. It is located in the DOS partition containing SERVER.EXE. Because we are using a SCSI disk drive, a special Future Domain, DTC or Adaptec disk driver will be loaded here. For NetWare network that needs to talk to TCP/IP networks, remember to set

SET MAXIMUM PHYSICAL PACKET SIZE=4020

## **AUTOUSER.BAT**

At the end the System Login Script, AUTOUSER.BAT in each user's home directory is invoked. This batch file will call NetWare's CAPTURE.EXE to set up the default printers for each group of users, and it will bring up the network menu pointed at by the environment variable **NETMENU** at the end. In fact, it would be much better if users is allowed to have his own login profile, like the **.PROFILE** of the UNIX operating system. This is left as a task for the MIS comrades.



## Chapter 5 Workstation Setup

Each user workstation's hard disk contains at least the following directories:

```
C:\
C:\DOS
C:\SYSLIB
```

C:\

COMMAND.COM

For safety, it is advised to change of the attributes of COMMAND.COM to Read-only, System and Hidden.

### CONFIG.SYS

For remote boot stations, remember to include this in NET\$DOS.SYS and NET\$OS1.SYS, or the user station's boot disk. CONFIG.SYS of user should at least have the following parameters:

```
FILES=32 (larger for more demanding applications)
BUFFERS=20 (32 for harddisk > 40M)
SHELL=COMMAND.COM /E:1024 /P
```

Make sure that there is a **/E:1024**. Our network uses a lot of DOS environemnt variables for keeping some important contants for a user's network session. For DOS 5 users, add the following lines:

```
DEVICE=C:\DOS\HIMEM.SYS
DOS=HIGH
```

### AUTOEXEC.BAT

The content of most user's AUTOEXEC.BAT is as follows:

```
@ECHO OFF
PATH C:\DOS;C:\SYSLIB
PROMPT $p$g
SET DIRCMD=/OG-D
SCAN C:\ /NOMEM /NOBREAK
CALL LAN.BAT (optional)
```

The second last line is for virus checking. It will call the McAfee SCAN.EXE assumed to be existing in C:\SYSLIB. The last line will invoke the network connection. Read the coming sections for more detail.

### WINA20.386

Required to run Windows 3.x. You can move this file to the Windows system directory, but you need to make some adjustments to the INI files of Windows then.

## C:\DOS

C:\DOS is especially important for MS-DOS 5.0 users because it contains the HIMEM.SYS for loading DOS high. Here is a typical DIR of C:\DOS:

HIMEM.SYS	For CONFIG.SYS
MODE.EXE	For setting keyboard speed. Try <b>MODE CON: RATE=35 DELAY=1</b>
CHKDSK.EXE	For check local disk's integrity.
XCOPY.EXE	
MEM.COM	
COMMAND.COM	A backup copy

## C:\SYSLIB

This directory contains useful utilities programs like McAfee's Virus scanner, the NetWare IPX and NETX, SHELL.CFG for optimizing the NETX and IPX, and others. Various network adaptor's IPX could be found in SRH486A/SYS:AUTOUSER/IPX. For the Windows VIPX, you could find it in SRH386A/SYS:UTILS/VIPX. Latest version of NETX is installed in SRH486A/SYS:AUTOUSER/NETX.

## LAN.BAT

Contains the following few lines:

```
@echo off
CLS
echo
echo |
echo |                               Assessing to SRH  Novell Netware
echo |
echo |
echo |
ipx
netx /c=c:\syslib\shell.cfg
echo Connected to SRHLAN ..
echo Please login ! CHAINMACRO(
f:
login
```

## SHELL.CFG

A sample SHELL.CFG are shown. Essentially, the settings in the SHELL.CFG increase the timeout period before NetWare cuts an inactive connection.

```
show dots = on
spx listen timeout = 182
spx abort timeout = 540
spx verify timeout = 54
cache buffers = 8
preferred server = SRH486A
```

You may optionally increase/decrease the size of network receive cache buffers.

For workstations that are to be used as remote printer server, you have to add the following few lines:

```
spx connections=1024
ipx sockets=1024
task mode=0
print header=255
print tail=255
```

## IPX.COM / NE2000.COM / 3C503.COM / GATEWAY / MYLEX

Because we lost contact with CSL, the NetWare 3.x drivers for Gateway 8-bit and 16-bit drivers are not available. So for machines that use Gateway adaptors, only the NetWare 2.15 drivers are available.

## NETX.COM

The latest version of NETx.COM DOS emulation shell do not need the installor to care about the version of DOS a machine is running. NETX.COM (version 3.10 as of December 1992) will replace NET3.COM, NET4.COM and NET5.COM (bundeld with MS-DOS 5).

## Chapter 6

### Description of Software in Use

SYS:LIB\HG23	Hardvard Graphics 2.3 -- the best-selling presentation graphics package in US. You can quickly produce transparencies and slides. Now comes with Draw Partner for free-hand drawing and large symbol libraries.
SYS:LIB\HG3	Hardvard Graphics 3.0 -- this version of HG now fully integrates the Draw Partner in HG23 into the base package. Most functionality found in the Draw-annotate functions like shading, dithering, ...
SYS:LIB\ET22	ETen 2.2 -- the best-selling Chinese system. Now have more input methods and support for extended memory. Note that users has defined new characters in the character bitmaps. They are contained in <b>USRFONT.??</b> and <b>XUSRCJ.TBL</b> . The former is the bitmaps and the later is the new characters" ChangJei input codes.
SYS:LIB\CWI	Comet I Chinese Word Processor version 1.50, used by Secretaries to prepare Chinese questionnaire. Note that KEYTABLE.DEF defines the keyboard map of the word processor.
SYS:LIB\CW2	Comet II, featuring an interaged system with DBMS, spreadsheet and word processor. Version 2.01.
SYS:LIB\SYSLIB	Assorted PC disk, printer and other utilities. A few worth mentioning: <ul style="list-style-type: none"><li>■ SCAN.EXE for virus detection from McAfee</li><li>■ CLEAN.EXE for virus removal</li><li>■ WASH.COM for cleaning diskette drive heads</li><li>■ DISKDUPE or DRCOPY for one-pass diskette duplication</li><li>■ XDEL.COM, RDIR or KILLDIR.EXE for removing directories including read-only files.</li><li>■ SWEEP.COM for repeating DOS commands at various levels of the DOS directory structure, ...</li><li>■ 4PRINT.EXE for printing program listing</li><li>■ DIVIDE.EXE for cutting up files into equal sections</li><li>■ CHOP.EXE for splitting source codes using keywords</li><li>■ QUICKKEY.COM a TSR to speed up cursor movement</li><li>■ FASTKEY.COM for changing the typmatic rate by setting the keyboard controller.</li><li>■ KEYCLICK.COM beeps on every key pressed</li><li>■ File compression programs:<ul style="list-style-type: none"><li>PKZIP 1.10, PKUNZIP 2.01/1.93A/2.04E</li><li>ARJ 2.30</li><li>LHA 1.13</li><li>PAK 2.50</li></ul></li><li>■ TURBOBAT for compiling batch files to COM</li><li>■ LL3.COM for file transfer between PCs through the parallel or serial port.</li></ul>

The files below are written by SRH DP System Team.

- SHOWP.EXE for showing current CAPTURE status.
- QMON.EXE or SHOWPJ.EXE for a listing and adjusting jobs in print queues
- HOME.EXE for returning a user to his/her home directory specified by the DOS environment variable HOMEDIR
- WAIT.EXE prompts the user to press a key or wait till time out. Used in AUTOEXEC.BAT of the file server.
- GETGRAPH.EXE checks the active graphics mode. Used to bring up application using the appropriate video mode.
- CHKCHIN.EXE checks the name of Chinese System currently active
- DIRE.EXE or DIRX.COM for checking disk usage for the first level sub-dir of a directory like SYS:USER.
- SNIPPER.COM for text mode screen capture
- LPT.COM redirects output to printer port to a file.
- LISTQ.COM for printing program listings to laser printer in both Landscape or Portrait mode.
- IDEINFO.EXE for checking the drive parameters of IDE hard disk.
- Q - Quick Editor 2.15
- NE.EXE and NE2.EXE - Norton Editors

SYS:LIB\NORTON	Norton Utilities 6.01 -- now with support for NetWare disk format and support for mouse. There are some version 4.5 utilities left behind. Norton Commander 3.0 can be found here as well.
SYS:LIB\BATCH	Batch files for invoking various in-house and external software applications or those that are not included in network's search path. Some useful batch files adopted from PC Magazines like DIRANY.BAT, PATHEDIT.BAT are placed here as well. Tricks are used in some cases to enforce multi-user behaviours on single-user software like Lotus 123 and Harvard Graphics. SELEQ.BT is the batch that allows end-users to select a print queue through a pull-down menu written in C called SQ_?????.C.
SYS:LIB\WP51	The best DOS-based word processing software ever built -- rivals that desktop publishing package with the correct printers and fontsets ..
SYS:LIB\123	Lotus 1-2-3 v2.2.
SYS:LIB\123R23	The most impacting spreadsheet product for DOS. Fully integrated WYSIWYG interface - more fonts, typefaces, sizes, .. Rivals Microsoft Excel 3.0...
SYS:LIB\PCTOOLS	PC Tools Deluxe 6.0
SYS:LIB\FOXPRO2	The best dBase dialect ever-built: FoxPro/LAN 2.0.

## Chapter 7

# System Operation Procedures

### Adding New User

You must modify the following when you add/delete a user from the network:

1. Create the user by running SYSCON.EXE. Make sure that the login name follows DOS file naming convention.
2. Assign the user to group EVERYONE.
3. Assign the user to other departmental groups and printer default group.
4. Create the user's data or home directory under SYS:USER.
5. Enable the user to have full access to his own data directory and mail directory.
6. Make sure that the user is allowed to use the print queues by running PCONSOLE.
7. Create AUTOUSER.BAT for the user. Make sure that after executing the batch file, he will be inside his data directory.
8. Login SUPERVISOR and run PRINTCON to copy the print job configuration file to the new user. This is required because by default, NetWare 386 treats all print jobs as text files, causing problems to Chinese printer output.
9. Run SYS:SYSTEM\BINDFIX.EXE to make a backup of new bindery.

### Adding New Printer

#### General

1. Install the necessary printer drivers in all software installed in the file server.
2. Assign the printer number from an existing print server to control the new printer
3. Add a new print queue. The name of print queue should reflect both the location of the printer and the model/type of printer it is. For example, QT\_III, RA\_III, ..
4. Allow the printer in the print server to serve the print queue by specifying in two places in PCONSOLE:
  1. Queue Servers
  2. Queues Serviced by Printer
5. Modify SELEQ.BT in SYS:LIB\BATCH. Compile it using TURBOBAT
6. Modify SQ\_486A.C file in SYS:LIB\BATCH. Compile it with Turbo C++ 3.0. Remember to specify the type of paper to be used and the location of the printer.

### File Server Backup

1. Backup the directory SYS:USER and SYS:SRHIS every afternoon during the lunch time using the WangTek compatible tape backup unit. Just login the account BACKUP. The AUTOUSER.BAT of BACKUP will invoke the NBACKUP.EXE automatically. In the future, use of Sytos Plus is highly recommended. User data is about 100-150 Mbytes in size. It is better to have a dedicated machine (or even Tape Server) to do the job. Its retention period should be one month.

For SRH486A, you can exclude the following file extensions in NBACKUP to save tape space:

- BK! - WordPerfect backup files
- BAK - General backup files from editors like QEDIT
- COM - user programs should have their source codes
- EXE - same as above
- BAT - Most batch files came from Novell Menu or AUTOUSER.BAT
- TMP - FoxPro/LAN temporary files
- ?DX - Indexes of dBase files, should be rebuildable by users

As at January 1992, SYS:USER and SYS:SRHIS totals to 120 Mbytes.

2. A backup of the whole volumn should be made every month. Its retention period should be one month accordingly.
3. User binderies( their login name, password, trustee assignments) are stored in two hidden files in SYS:SYSTEM called NET\$BVAL.SYS and NET\$BIND.SYS. If there a user logging on, the bindery files will be opened and CANNOT be backed up. It is suggested that before backing up the Netware, log out all users first.

You can still back up the two bindery files by the following procedure:

- i) run BINDFIX.EXE once. Two files will be created: NET\$BVAL.OLD and NET\$BIND.OLD.
- ii) copy the two files to a diskette.
- iii) you can run BINDREST to restore them.

BACKUP REGURLARLY. YOU NEVER KNOW WHEN DISASTER COMES. WHEN IT COMES, YOU WILL BE HELD RESPONSIBLE FOR IT IF YOU DON"T BACKUP.

## Adding/Removing Software

1. Create a sub-directory under SYS:LIB if not already done so.
2. Install the software.
3. FLAG all **.EXE**, **.COM** and overlay files to read-only and even COPY-INHIBIT to deter privating of software; unless there are restrictions, all files should also be flagged SHAREABLE to allow multiple users to open and read it.
4. Grant access of this new directory to the appropriate group or user using SYSCON.
5. If necessary, update the PATH in system login script. Or create a batch file in SYS:LIB\BATCH to invoke the application using the following example:

```
@echo off
@echo Loading dBase III+ 1.0 ...
map ins s1:=sys:lib\dbase
dbase
map del s1:
```

Note the trick I used in the *MAP INS* clause.

6. Update the APPEND command in each application"s invocation batch file if necessary.

8. Update the default MAP settings in System Login Script.

## Removing Useless Files

1. Remove all \*.bak files using a utility in SYS:LIB\BIN called SWEEP.COM. This program will execute a given DOS command in the current directory and the associated sub-directory. So to delete \*.BAK from the server disk,
  - i. Goto SYS: or F:\
  - ii. Enter at DOS prompt: SWEEP \*.BAK

Users should be taught not to name their files with an extension **.BAK**.

2. The following files are produced by Novell's menu system and should be removed regularly to save disk space:

```
GO???.BAT
RESTART.???
????????.QQQ
```

They are usually found in the user's own data directory.

4. WordPerfect may produce back up file with the extension **.BK!**.
5. FoxPro/LAN 2.0, during its execution, generates a lot of temporary files of the form \*.TMP and \$??????. FoxPro will delete them when it quits, but occasionally due to machine failure or man-made errors, the files are left undeleted. They are very large in size. It is advised to delete those files at daily basis.

**IMPORTANT** DO NOT DELETE THESE FILES UNTIL THERE IS NO USER USING THOSE SOFTWARE; OTHERWISE, USER MAY LOSE THEIR DATA.

## Removing User

1. Ask the appropriate person to see if the data of that user needs to be backed up. If not, remove all his/her files and his/her user directory.
2. Delete the user from his/her belonging groups via SYSCON. Run BINDFIX if necessary.
3. Delete the user's login name via SYSCON.
4. Clean the deleted user's home directory. There are several ways to achieve the task:
  - a. Archive his/her data directory to SRH486DP/SYS: and look for a potential owner. If no one wants it, purge it after a sufficiently long retention period.
  - b. Transfer his/her data to an existing user.



## Chapter 8 Problem Determination

### Shared Printer Failure/Printer Off-line

NetWare 286

1. Check all hardware associated with the printer to see if there is error like IRQ conflict, or disabled printer IRQ.
2. Check if the connection between the printer and the computer is OK.
3. Make sure that the job queue containing jobs is served by the intended printer. This can be verified by deleting all queues associating with the problem printer and re-assign busy queues to it again.

capture  
Local -----> print ---> spool -----> network  
LPT1           queue           printer           printer

You can see from the above diagram that network printing is actually a 3-step process. CAPTURE.EXE will route local LPT1 to a print queue. NetWare will then flush the print queue's content into a spool printer. From the spool printer, the bytes will be passed to COM1, COM2, LPT1 OR LPT2 of **SERVER**. A network printer should be found attaching to those server ports.

**NEVER** assume that PRINTER 0 is LPT1. It can be COM1 or COM2. PRINTER 0 is a NetWare spooler. The actual output device for each spooler is set during NetWare installation.

4. If NetWare print forms are defined, make sure you have mounted them: PRINTER ? MOUNT FORM ?

### File Server Disk Failure/error When Starts Up

1. Run VREPAIR.EXE from the Novell Netware's Utility disk to fix all bad FAT sectors and disk blocks.  
  
For a **25ms 100 Mbytes** hard disk, it took at most **18 minutes** to finish the procedure.
2. Restore the corrupted files from the backup tapes.

### Error 255: GetObjectName Error

1. Logout all users and login SUPERVISOR.
2. Run SYS:SYSTEM\BINDFIX.EXE
3. Run SYSCON again to verify user information.
4. If you have a updated copy of NET\$BVAL.OLD and NET\$BIND.OLD, copy them to SYS:SYSTEM and run BINDREST.EXE. This program will restore the settings stored in the two bindery files to the current ones.

## **Error Finding Boot Disk Image**

1. Make sure that the appropriate boot disk image is placed in SYS:LOGIN.
2. Check if two stations are placed too close to each other.
3. Check connector along the coaxial cable forming the bus.

## **No Free Connections In File Server**

1. Check if total number of connections exceeds 250
2. Check if the station's system unit has problems. This can be done by replacing the station with a working one.

## **No Packet Receive Buffers**

1. Check if you have set the limit for the MAXIMUM PACKET RECEIVE BUFFERS too low at the file server console.
2. Check if you have load a LAN driver with correct IRQ and MEM for each network adaptor in the file server. In that case, packets are queued and stucked in the memory buffer, unable to be broadcasted to the cable.

## Chapter 9 Installation of Bridge

The procedure involved in installing an external and internal bridges are detailed in the NetWare's installation manual. I will not recite all those material but will just explain some potential problems you may encounter when doing the installation process.

If you are installing a bridge using two network adaptor like NE1000 and 3C501, BRGEN will ask you the network address of each adaptor. How can you know? The solution is simple. Reach for the console of each adaptor's file server. Type CONFIG at the console prompt. Look for the line NETWORK ADRESS which contains a node address and a physical address. The node address portion is the information you want. You can also access those information using FCONSOLE locally as a SUPERVISOR.

The two set of NetWare to be bridged together must have different serial numner, or you will receive the following broadcasted message every three minutes:

"Copyright Violation! Please inform Supervisor."

Remote bridge can be used to allow remote login. But the response time is slow because NetWare always download the programs to the station who requested it. Given the slow transfer rate of modems (2400 bps vs 10 Mbps), you would not like it at all. For remote login, I suggest the use of PC Anywhere and Doorway programs found in public domain. Those problems exchange only video I/O with remote terminals, leaving the disk-intensive and CPU-intensive work in the host.

### Ethernet Adaptors

Each network interface adaptor (NIC) has an 48-bit physical address that is unique in the world. The physical address is regulated by IEEE. The physical address is made up of serveral parts. The very first 32-bit contains the manufacturer ID. You can find the following manufactueres in SRHLAN.

8001700	National Semi-conductors
86E1	3Com
2608C38	Novell Inc
1B30	Gateway

NS has two types of NE2000 compatible NICs. The first batch is modelled exactly after the NE2000 adaptors, in both the layout and jumper settings definitions. The second type has one enhancement: the jumper-based configuration is now stored in non-volatile memory. By the executing the program ENCONFIG.EXE found in the configuration diskette

## **Chapter 10 Hardware Maintenance**

### **HP LaserJet III**

1. The Ozone Filter must be replaced every 50000 pages printed to avoid health risk to employees.

### **HP PaintJet XL**

# Chapter 11

## Network Printer

One of the advanced technology in NetWare 386 is its print server. A print server can server print queues from different servers, and control printers that are local to the print server(i.e. directly connected to the print server) and those that are remote to it (i.e. connected to user workstations).

### 10.1 Connecting Printronix P300 to Server

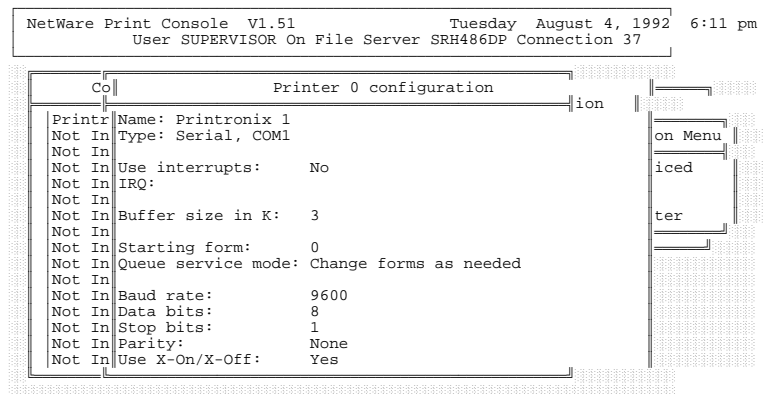
#### Wiring Diagram

The wiring assignments for connect the Printronix P300 to IBM/PC is given below:

PC	2	—————	3	Printronix
	3	—————	2	
	6	—————	6	
	7	—————	7	

#### Print Server Setup

Bring up PCONSOLE. The printer configuration of the printer connecting to the P300 is shown below:



### 1 0 . 2

#### Establishing Remote Queue-Local Server Connection

## Chapter 12 Some Useful Cables

### 12.1. LapLink Cable: Serial

DB9		DB25		DB25		DB9
2	_____	3	_____	2	_____	3
3	_____	2	_____	3	_____	2
4	_____	20	_____	6	_____	6
5	_____	7	_____	7	_____	5
6	_____	6	_____	20	_____	4
7	_____	4	_____	5	_____	8
8	_____	5	_____	4	_____	7

### 12.2. LapLink Cable: Parallel

DB25		DB25
2	_____	15
3	_____	13
4	_____	12
5	_____	10
6	_____	11
10	_____	5
11	_____	6
12	_____	4
13	_____	3
15	_____	2
24	_____	25

### 12.3. LapLink Cable: Centronics 36

DB25		DB25
2	_____	32
3	_____	13
4	_____	12
5	_____	10
6	_____	11
10	_____	5
11	_____	6
12	_____	4
13	_____	3
15	_____	2
25	_____	30

## 12.4. RS-232C Serial (Modem)

DB25		DB25
2	—————	2
3	—————	3
4	—————	4
5	—————	5
6	—————	6
7	—————	7
8	—————	8
20	—————	20

## Chapter 13

# Disk Space Management

Novell NetWare allows two level of disk space usage control.

### Control by User

You can control the total amount of disk space used by individual user using SYSCON. Choose **User\_Information.Volume\_Restriction**. Enable the volume restriction option and enter the ceiling value of his/her disk space usage. The value should not be too small because when calculating a user's total disk space used, NetWare include the queue file created during printing. The size of print file should NEVER be limited.

### Control by Directory

This is a finer control. Run the NetWare command DSPACE after making the directory whose is going to be restricted the default directory. It will limit the maximum space taken up by the directory plus its sub-directories. In fact, this method is more fair than SYSCON, but the mangement is more difficult.

But this method suffers from not being able to control the total disk space requirements of a group of users who do not come under the same parent directory. But if their data directories are placed under the same parent directory, they will have a hard to changing directories in their daily task and the convenience of SYS:USER concept would be void.



## Chapter 14 Special C Programs for SRHLAN

Throughout these years, SRHLAN has experienced a tremendous growth and technology advanced. To ensure that user can easily tap the power of the network, several mini C programs are written by the DP (MIS) System Team to facilitate user to change directory, select network and to facilitate the system team the administer the network.

### DIRE

A simple C program that will count the total size of directory subtree. This program is useful in listing the total disk storage taken by individual user's home directory.

```
/*
DIRE by Chang Man Wai

Check the disk space used by each user in SYS:USER.
Reverse-engineered from Yung Chun Kau's DIRX (Pascal).

Compile with Turbo C++ 3.0

*/
#include <stdio.h>
#include <stdlib.h>
#include <dos.h>
#include <dir.h>
#include <string.h>
#include <conio.h>
#include <ctype.h>
#include <math.h>

#define PATH_LENGTH 400
#define PROG_NAME "DIRE v1.22"
#define USAGE "Usage: DIRE [substr]"
#define FALSE 0
#define TRUE 1

char *add_slash(char *s);
float dir_size(char *pathname);
void depth_first(char *pathname, int level);

char filter[PATH_LENGTH];
float tree_total;

void main(int argc, char **argv)
{
    char cur_dir[PATH_LENGTH];
    int i, j;

    filter[0] = NULL;

    if (argc > 1)
    {
        j = strlen(argv[1]);
        strcpy(filter, argv[1]);
        for (i=0; i<j; i++)
            if (isalpha(filter[i])) filter[i]=_toupper(filter[i]);
    }

    printf("\n%s", PROG_NAME);
    cprintf("\r%s", PROG_NAME);
    printf("\n%s", USAGE);
    cprintf("\r%s", USAGE);

    getcwd(cur_dir, PATH_LENGTH);

    printf("\n\nWorking on %s. Filter = \"%s\"", cur_dir, filter);
    cprintf("\rWorking on %s. Filter = \"%s\"", cur_dir, filter);
    printf("\n\n%23s%10s\n", "MBytes", "KBytes");

    /* show current directory size */
    printf("\n%-12s ", ".");
    tree_total=dir_size(cur_dir);
    putchar("\b"); putchar(" ");
    printf("%10.0f%10.0f", tree_total/1024, tree_total);

    depth_first(cur_dir, 0);

    printf("\n\n%-13s%10.0f%10.0f", "total", tree_total/1024, tree_total);
    cprintf("\r%-13s%10.0f%10.0f\n\r", "total", tree_total/1024, tree_total);
}
```

```

    putchar("\n");
}

char *add_slash(char *s)
{
    if (s[strlen(s)-1] != "\\")
        strcat(s, "\\");
    return(s);
}

void depth_first(char *pathname, int level)
{
    struct ffbk c_ffbk;
    char subtree[PATH_LENGTH];
    int process_dir;
    register int done;
    static float tree_size=0;

    strcpy(subtree, pathname);
    add_slash(subtree);
    strcat(subtree, ".*");

    if (level > 0) tree_size += dir_size(pathname);

    done=findfirst(subtree, &c_ffbk, (int)FA_DIREC);
    while (!done && !kbhit())
    {
        if (c_ffbk.ff_attrib == FA_DIREC) /* work on sub-dir only */
            if (c_ffbk.ff_name[0] != ".") /* [.] and [...] will be ignored */
            {
                process_dir=TRUE;
                if (filter != NULL && level == 0)
                    process_dir = (strstr(c_ffbk.ff_name, filter) != NULL);

                if ( process_dir )
                {
                    if (level==0)
                    {
                        printf("\n%-12s ", c_ffbk.ff_name);
                        tree_size = 0;
                    }

                    /* ready next level of pathname */
                    strcpy(subtree, pathname);
                    add_slash(subtree);
                    strcat(subtree, c_ffbk.ff_name);

                    depth_first(subtree, level+1);

                    /* complete depth-first search, show total sub-tree size */
                    if (level == 0)
                    {
                        putchar("\b");
                        putchar(" ");
                        printf("%10.0f%10.0f", tree_size/1024, tree_size);
                        tree_total += tree_size;
                    }
                }
            }
        done=findnext(&c_ffbk);
    }
}

float dir_size(char *pathname)
{
    struct ffbk my_ffbk;
    float total_size;
    register int done;
    char t[PATH_LENGTH];

    strcpy(t, pathname);
    add_slash(t);
    strcat(t, ".*");

    total_size = 0;
    done=findfirst(t, &my_ffbk, FA_HIDDEN);
    while (!done && !kbhit())
    {
        total_size += my_ffbk.ff_fsize;
        done=findnext(&my_ffbk);
    }
    return (total_size/1024);
}

```

}

## HOME

```
/*
  return a user to the directory specified by DOS environment variable HOMEDIR
  in drive F:
  Written by Chang Man Wai
*/
#include <stdio.h>
#include <stdlib.h>
#include <dir.h>

void main()
{
  int i = 4;

  /* printf("%s\n", getenv("HOMEDIR")); */
  /*
   attempt to change to HOMEDIR at current drive first, if failed
   try F:, then G:, ...
  */
  while (chdir(getenv("HOMEDIR")) == -1 && i <= 26) setdisk(i++);
}
```

## WAIT

```
#include <time.h>
#include <dos.h>
#include <stdlib.h>
/*
WAIT.C - written by Chang Man Wai
        revised by Adam Chan: add variable prompt

Wait for given number of seconds, seconds elapsed will be shown
- useful in bringing up file/print server after some delay
*/

int      elapsed_time();
short    get_active_page();
unsigned save_cursor(short active_page);
void     restore_cursor(unsigned cursor_info);
void     no_cursor();

void main(int argc, char *argv[])
{
    char s[3];
    char *prompt;
    short active_page;
    unsigned cursor_info;

    if (argc<2)
    {
        puts("WAIT v1.2");
        puts("Usage: wait <seconds> [prompt]");
        puts("        ERRORLEVEL 1 if keypressed");
        exit(1);
    }
    if (argc>2)
        prompt=argv[2];
    else
        prompt="Press any key to Stop ...";
    putchar("\n");
    active_page = get_active_page();
    cursor_info = save_cursor(active_page);
    no_cursor();
    while (elapsed_time() < atoi(argv[1]))
    {
        printf("\r%s%3d",prompt,atoi(argv[1])-elapsed_time());
        if (kbhit())
        {
            bioskey(0);      /* remove the key from keyboard buffer */
            puts("\r
                restore_cursor(cursor_info);
                exit(1);
            }
        }
        puts("\r
                restore_cursor(cursor_info);
                exit(0);
            }

int elapsed_time()
{
    static int start_time = 0;

    start_time = 0 ? clock()/CLK_TCK : start_time;
    return(abs(start_time-clock()/CLK_TCK));
}

short get_active_page()                /* get active display page */
{
    union REGS regs;
    regs.h.ah=0x0F;
    int86(0x10,&regs,&regs);
    return(regs.h.bh);
}

unsigned save_cursor(short active_page) /* hide cursor (Adam) */
{
    union REGS regs;

    regs.h.ah = 0x03;
    regs.h.bh = active_page;
    int86(0x10,&regs,&regs);
    return(regs.x.cx);
}
```

```
void no_cursor()
{
    union REGS regs;

    regs.h.ah = 0x01;
    regs.h.ch = 20;
    regs.h.cl = 19;
    int86(0x10,&regs,&regs);
}

void restore_cursor(unsigned cursor_info)    /* restore normal cursor */
{
    union REGS regs;

    regs.h.ah = 0x01;
    regs.x.cx = cursor_info;
    int86(0x10,&regs,&regs);
}
```

**SHOWP**

```

/*****
PURPOSE:   Show active network printer queue name
DATE:     03/24/92
ENVIRON:   Turbo C++ v3.0, Small model (w/packed structures) or
           Link w/SNIT.LIB of NetWare C Interface-DOS v1.2
Adopted from Novell by Chang Man Wai
*****/
#include <stdio.h>
#include <stdlib.h>
#include <string.h>
#include <ctype.h>
#include "nit.h"
#include <niterror.h>
#ifdef __TURBOC__
#include <dir.h>
#else
#include <direct.h>
#endif

// Generic, non-compiler-specific macros to build and split far pointers
#define xMK_FP( seg,ofs ) ( (void _far * )((unsigned long)((unsigned long)(seg) << 16 ) +(
unsigned long)( ofs) & 0xFFFF ))
#define xFP_SEG( fp )((unsigned)( (unsigned long)(void far *)(fp) >> 16))
#define xFP_OFF( fp )(((unsigned)( (unsigned long)(void far *)(fp) & 0xFFFF)))

// Globals
char fsName[80], queueName[48];
BYTE majorVersion, minorVersion, revisionLevel, oldLPT;
WORD objectType, oldConnectionID;
CAPTURE_FLAGS setCaptureFlags;
CAPTURE_FLAGS getCaptureFlags;

// Prototypes
void exitout(int);
void ShowSettings(void);

void main(int argc, char **argv)
{
    int retCode = 0, count, count2;
    char *tempArg;
    char fileName[255], vName[16];
    char dirName[255], VOLPath[255];
    char objectName[48];
    BYTE localPrinterToCaptureTo;
    WORD captureFileConnectionID, printServerConnectionID, serverNumber;
    long objectID;

    printf("\nSHOWP v1.0\n\n");

    oldConnectionID = GetDefaultConnectionID();
    oldLPT = localPrinterToCaptureTo = GetDefaultLocalPrinter();

    // Get shell version to handle problems in certain shells
    retCode = GetNetWareShellVersion(&majorVersion, &minorVersion, &revisionLevel);
    if (retCode == 0)
    {
        printf("\nShell version too old\n");
        exit(1);
    }

    // Process the command line options so we know the LPT of concern right away
    for (count=1; count<argc; count++)
    {
        if (argv[count][0] == "-" || argv[count][0]=="/")
            argv[count]++; // Remove option prefix
        if (toupper(argv[count][0]) == "L")
        {
            if (argv[count][1] == "=")
                localPrinterToCaptureTo = atoi(&argv[count][2]) - 1;
            else
                localPrinterToCaptureTo = atoi(&argv[count][1]) - 1;
            if (localPrinterToCaptureTo >2)
            {
                printf("Device out of range: %s\n", localPrinterToCaptureTo+1);
                exitout(1);
            }
        }
    }

    // Now that we know the LPT of concern, lets set up the default printer, etc.

```

```

SetDefaultLocalPrinter(localPrinterToCaptureTo);
GetDefaultCaptureFlags(&setCaptureFlags);

retCode = GetLPTCaptureStatus(&serverNumber);
retCode = 0;
if (retCode == 0) // Reset flags if not currently captured
{
    setCaptureFlags.status = 0x00;
    setCaptureFlags.flags = 0x00;
    setCaptureFlags.tabSize = 0x08;
    setCaptureFlags.serverPrinter = 0x00;
    setCaptureFlags.numberOfCopies = 0x01;
    setCaptureFlags.formType = 0x00;
    setCaptureFlags.localLPTDevice = 0x00;
    setCaptureFlags.flushCaptureTimeoutCount = 0x00;
    setCaptureFlags.flushCaptureOnDeviceClose = FALSE;
    setCaptureFlags.maxLines = 66;
    setCaptureFlags.maxChars = 132;
    setCaptureFlags.formName[0] = "\0";
    setCaptureFlags.LPTCaptureFlag = FALSE;
    setCaptureFlags.fileCaptureFlag = FALSE;
    setCaptureFlags.printQueueFlag = FALSE;
    setCaptureFlags.printQueueID = 0x00;
}
retCode = GetLPTCaptureStatus(&printServerConnectionID);
ShowSettings();
}

/*****
ShowSettings: Process /SH parameter by showing capture settings for each
printer
*****/
void ShowSettings(void)
{
    int count, retCode;
    WORD currentConnectionID;
    char temp[64];

    // Check each printer port we can capture
    printf("%-5s%-20s%-10s%-10s\n", "LPT", "QUEUE", "TIMEOUT", "FORMFEED");
    for (count = 0; count < 3; count++)
    {
        // Show LPT port number
        printf("%-5d", count + 1);

        SetDefaultLocalPrinter(count);
        retCode = GetLPTCaptureStatus(&currentConnectionID);
        // Are we capturing?
        if (retCode != 0)
        {
            GetDefaultCaptureFlags(&getCaptureFlags);
            SetPreferredConnectionID(currentConnectionID);
            GetFileName(currentConnectionID, fsName);

            // Display what we're capturing to (server queue/file name)
            // printf("Capturing data to %s ", fsName);
            if (getCaptureFlags.fileCaptureFlag)
                printf("%-20s", "*** FILE ***");
            else
            {
                if (getCaptureFlags.printQueueFlag)
                {
                    GetBinderyObjectName(getCaptureFlags.printQueueID,
                        queueName, &objectType);
                    // printf("queue %s.\n", queueName);
                    printf("%-20s", queueName);
                }
                else
                    printf("printer %d.\n", getCaptureFlags.serverPrinter);
            }
        }
        else
            printf("%-20s", "*** LOCAL ***");

        // get Timeout setting
        if (getCaptureFlags.flushCaptureTimeoutCount == 0)
            printf("%-10s", "Disabled");
        else
            printf("%-10u", IntSwap(getCaptureFlags.flushCaptureTimeoutCount)/18);

        // Do we send form feeds at the end of a job?
        printf("%-10s\n", (getCaptureFlags.flags & 0x08) ? "no" : "yes");
    }
}

```



```
    }
    SetDefaultLocalPrinter(oldLPT);
    exitout(0);
}

/*****
exitout: Cleanup routine
*****/
void exitout(int retCode)
{
    if (oldConnectionID != 0)
        SetPreferredConnectionID(oldConnectionID);
    exit(retCode);
}
```

## CHKCHIN

```
#include <stdio.h>
#include <dos.h>

enum { NOCHINESE, ET, ZERO, DRAGON, KC };

int et();
int zero();
int dragon();
int kc();

void main(int argc, char *argv[])
{
    if (et() == ET) {
        printf("Eten Chinese System is running.\n");
    }
    else if (zero() == ZERO) {
        printf("Zero-One Chinese System is running.\n");
    }
    else if (dragon() == DRAGON) {
        printf("Dragon-Disk Chinese System is running.\n");
    }
    else if (kc() == KC) {
        printf("Kuo Chiau Chinese System is running.\n");
    }
    else {
        printf("No Chinese System is running.\n");
        exit(0);
    }
    exit(1);
}

int et()
{
    union REGS r;

    r.x.ax = 0x9100;
    int86(0x10, &r, &r);
    if (r.x.ax != 0x9100)
        return(ET);
    else
        return(NOCHINESE);
}

int zero()
{
    union REGS r;

    r.x.ax = 0x59ff;
    int86(0x10, &r, &r);
    if (r.h.al != 0xff)
        return (ZERO);
    else
        return(NOCHINESE);
}

int dragon()
{
    unsigned char far *pj;

    pj = MK_FP(peek(0,0x5a), peek(0,0x58));
    if (*pj == 0x90)
        return(DRAGON);
    else
        return(NOCHINESE);
}

int kc()
{
    union REGS r;

    r.x.ax = 0x9100; /* if it does not work, try r.x.ax = 0xcc00 */
    int86(0x16, &r, &r);
    r.h.al ^= r.h.al;
    if ((r.h.ah - 0x05) == 0x00)
        return(KC);
    else
        return(NOCHINESE);
}
```

## GETGRAPH

```
/*
 Detect a machine's best graphics hardware
 Written by Chang Man Wai
 */
#include <graphics.h>
#include <stdio.h>

int main(int argc, char *argv[]) {
    int graphdriver;

    printf("\nGETGRAPH v1.0\n");
    detectgraph(&graphdriver, NULL);
    if (argc>1) {
        printf("- return machine's best graphics hardware as errorlevel"
            "\n\n\t0 for none"
            "\n\t%d for CGA\t\t%d for MCGA"
            "\n\t%d for EGA\t\t%d for EGA 64 Color"
            "\n\t%d for EGA Mono\t\t%d for VGA"
            "\n\t%d for Hercules",
            CGA, MCGA, EGA, EGA64, EGAMONO, VGA, HERCMONO);
        printf("\n\nExit with %d\n", graphdriver);
    }
    return(graphdriver);
}
```

Departments and Research. Overview. Schools and Departments. MIS is the Study of People, Technology and Organizations. If you enjoy technology like iPhones, Amazon Echo and Instagram, you have what it takes to study information systems. All you need is an interest in technology and the desire to use technology to improve people's lives. Many people think that MIS is all programming. However, programming is just a small part of our curriculum and there are many, many jobs in MIS where you do not program. Our minor in MIS is designed to complement your primary area of study by providing a background in and understanding of decision-making processes in organizations, organizational needs for information systems development, and application of modern MIS concepts and tools to meet organizational needs. Our Information Technology Project Management certificate provides you with the fundamental knowledge you will need to manage the development and delivery of Information Technology and related projects. Management information system (MIS) refers to the processing of information through computers and other intelligent devices to manage and support managerial decisions within an organization. Chief technology officers (CTOs) are responsible for evaluating how new technology can help their organization. They usually recommend technological solutions to support the policies issued by the CIO.[2].